Citation:

Nielsen BM, Bjørnsbo KS, Tetens I, Heitmann BL. Dietary glycaemic index and glycaemic load in Danish children in relation to body fatness. *Br J Nutr.* 2005 Dec; 94 (6): 992-997.

PubMed ID: 16351778

Study Design:

Cross-Sectional Study

Class:

D - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To describe the glycemic index and glycemic load of the habitual diet of Danish children, and examine the possible associations between dietary glycemic index and glycemic load with body composition.

Inclusion Criteria:

10- and 16-year-old children from Odense, Denmark enrolled as part of the European Youth Heart Study.

Exclusion Criteria:

None.

Description of Study Protocol:

Recruitment

Subjects were part of the European Youth Heart Study, details have been published previously.

Design

Cross-sectional.

Dietary Intake/Dietary Assessment Methodology

- Information was obtained by a 24-hour recall supported by a qualitative food record
- Subjects completed a qualitative food record at home, followed the next day by an in-person interview
- Interviews were conducted on school days, so dietary information was not obtained for

Fridays and Saturdays.

Blinding Used

Not applicable.

Intervention

Not applicable.

Statistical Analysis

- Analysis of variance and T-tests were performed to compare groups means using Tukey's procedure to adjust for multiple comparisons
- Analyzing homogeneity of variances was conducted using Levene's test
- Groups of data that were non-normal were analyzed using Kruskal-Wallace and Mann-Whitney tests, with Bonferroni's adjustment to control for multiple comparisons.

Data Collection Summary:

Timing of Measurements

24-hour dietary recall and non-dietary measurements were collected on a school day (Monday through Friday) during the school year (August 10, 1997 through July 12, 1998).

Dependent Variables

- Body composition: Sum of four skinfold thicknesses
- Body mass index (BMI)

Independent Variables

- Dietary glycemic index: Weighted average of the glycemic index values of each of the foods consumed
- Dietary glycemic load: Overall dietary glycemic index multiplied by the total daily intake of carbohydrate in grams.

Control Variables

- Fitness (relative V_{O2max} based on maximal power output)
- Weight
- Height
- Protein intake
- Fat intake
- Pubertal status
- Total energy intake.

Description of Actual Data Sample:

- *Initial N:* 1,020
- *Attrition (final N):* 849 with complete data
- *Age:*
    - 10-year olds (262 girls and 223 boys)

- 16-year-olds (183 girls and 181 boys)
- *Ethnicity:* Not reported
- *Other relevant demographics:* None
- Anthropometrics:
  - Median BMI (kg/m^2) for 10-year-olds was 16.7 for girls and 16.7 for boys
  - For 16-year-olds was 20.6 for girls and 20.5 for boys
- *Location:* Odense, Denmark.

Summary of Results:

Association between dietary glycemic index or glycemic load and body composition expressed as the sum of four skinfold thicknesses of children grouped by age and gender [Beta coefficient (standard error)].

Variables	10-year-old Girls N=262	10-year-old Boys N=223	16-year-old Girls N=183	16-year-old Boys N=181
Dietary glycemic index[a]	0.29 (0.17)	-0.13 (0.17)	-0.09 (0.17)	0.60 (0.21)*
Dietary glycemic load[b]	0.08 (0.05)	-0.02 (0.05)	0.05 (0.05)	0.15 (0.06)**

[a]: Adjusted for fitness (ml O_2 per minute per kg), $\log_e$ weight, height, protein intake, fat intake, total energy intake by the residual method, and, among 10-year-old girls, whether puberty had started.

[b]: Adjusted for fitness (ml O_2 per min per kg), $\log_e$ weight, height, protein intake, fat intake, total energy intake by the residual method, and, among 10-year-old girls, whether puberty had started.

*P-value=0.006

**P-value=0.009

Other Findings

- Glycemic index was similar for Danish girls and boys aged 10 and 16 years, whereas 16-year-old boys had a higher daily dietary glycemic load than both girls of a similar age and younger girls and boys
- Glycemic index and glycemic load were positively associated with body fatness among Danish 16-year-old boys, whereas no associations were found between girls or younger boys. A difference in dietary glycemic index of 10% was associated with a 6 (standard error, 2)% higher skinfold thickness sum, whereas a dietary glycemic load of 10% was associated with a 1 (standard error, 0.6)% higher skinfold thickness sum among 16-year-old boys
- Associations between energy-adjusted dietary glycemic index or glycemic load and BMI were not significant among each group of age and gender.

Author Conclusion:

- Dietary glycemic values were positively associated with body fatness among 16-year-old

Danish boys, whereas no associations were found among 16-year-old girls, potentially because of under-reporting
- Associations were also insignificant for the 10-year-old subjects.

Reviewer Comments:

Author-identified limitations/comments:

- *There may have been under-reporting by the older girls of their habitual food intake*
- *Since information on the glycemic index of Danish food is scarce, there may have been bias introduced when calculating glycemic index and glycemic load*
- *A more valid measure of body fat mass may be needed than skinfold thickness measurements.*

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	N/A
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions

1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes

2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	**Were study groups comparable?**	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	N/A
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	N/A
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	N/A
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	N/A
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	Yes
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	N/A
4.1.	Were follow-up methods described and the same for all groups?	N/A
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	N/A
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	N/A
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	No
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	N/A

5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	No
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	N/A
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	Yes
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	Yes
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	No
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	N/A
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	No
7.5.	Was the measurement of effect at an appropriate level of precision?	No
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes

8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	No
8.7.	If negative findings, was a power calculation reported to address type 2 error?	No
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes